

# SINAMICS S120 AC Drive

## SINAMICS S120 AC Drives – a building block for integrated drive solutions

SINAMICS S120 is a modular drive system with servo and Vector Control and is the SINAMICS product which is most suitable for demanding drive applications in the fields of mechanical and plant engineering. The SINAMICS S120 AC Drives especially supplement the DC/AC units with a central power infeed and a DC link in types Booksize and Chassis for multi-axis applications. Optimally tailored integrated solutions can be designed for any type of application based on this building block system.

### The ready-to-connect SINAMICS single drive with integrated power infeed

SINAMICS S120 AC Drives are designed for single-axis applications but can also be used for multi-axis applications. This means that it is just as easy to find reliable solutions for positioning tasks for single axes as it is for synchronism and motion control tasks. In multi-axis applications with spatially distributed drives, distributed solutions based on SINAMICS S120 AC Drives offer a practical alternative to a central drive solution with a central infeed and a DC link thanks to the integrated power infeed.

#### Universally implementable

SINAMICS S120 AC Drives can easily be implemented in conjunction with higher-level automation systems using field bus interfaces and the standardized PROFIdrive profile. Solutions to standard positioning tasks – especially in the SIMATIC environment – can therefore be found using SINAMICS S120 AC Drives even without in-depth knowledge of drives.

Because it is so easy to combine SINAMICS S120 AC Drives with other SINAMICS S120 units, multi-axis groupings can be extended comfortably and economically. Modular machine components can thus be adapted to high levels of integration and flexibility in line to varying customer requirements.

#### Flexibility through modularity

Every SINAMICS S120 AC Drive consists of a Power Module which includes a power infeed, a power control and an optional filter.

If the AC Drive is operated as a single-axis drive combined with a higher-level control, a Control Unit (e.g. CU310 DP) is added to the Power Module. It contains the entire control intelligence for the drive, including positioning functions and the field bus interface.

If the AC Drive is combined with other SINAMICS S120 products as part of a drive solution, a Control Unit adapter is added to the Power Module in order to connect the AC Drive to a higher-level Control Unit (e.g. CU320 for multi-axis control) via the DRIVE-CLiQ interface in accordance with the SINAMICS S120 system architecture.

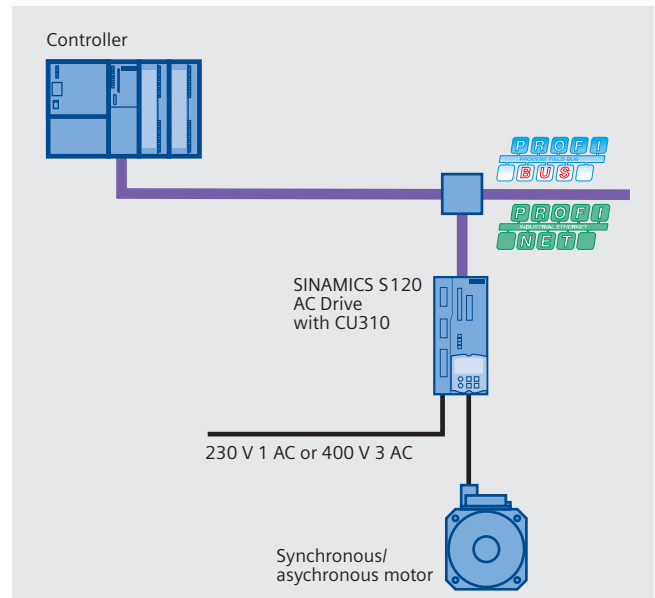


Figure 1: SINAMICS S120 AC Drive connected to a higher-level control

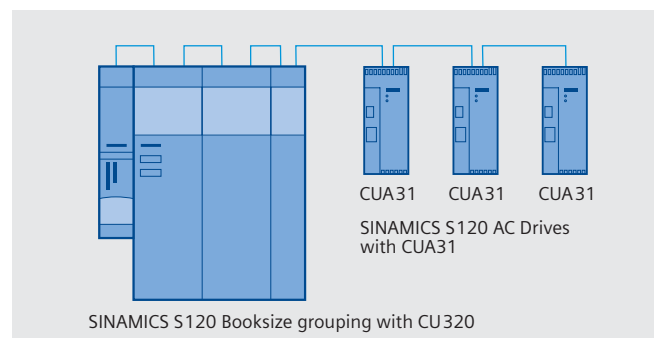


Figure 2: 3 SINAMICS S120 AC Drives connected to a SINAMICS S120 multi-axis grouping

# SINAMICS S120 AC Drive

## CU310 Control Unit

The use of SINAMICS S120 AC Drives in single-axis applications connected to a higher-level control is illustrated in Figure 1. Each of the AC Drives is equipped with a CU310 Control Unit. This unit contains the field bus interface for connecting to the higher-level control. CU310 DP with a PROFIBUS DP connection or CU310 PN with an integrated Profinet interface can be selected. In both cases communication between the control and the drive takes place in accordance with the standardized PROFIdrive profile.

CU310 offers functions ranging from the simple speed controller to full positioning functionality.

Drive-related inputs/outputs can easily be linked in the CU by means of BICO technology. This permits the greatest possible separation of drive and higher-level control.

Various types of drive-related inputs/outputs and encoders are connected easily via the DRIVE-CLiQ interface.

It is easy to implement safety systems using integrated safety functions such as "Safe standstill" (SH) and "Safe brake control" (SBC).

## CUA31 Control Unit adapter

It is also possible to use SINAMICS S120 AC Drives in multi-axis applications. The drive is connected to a CU320 Control Unit via the DRIVE-CLiQ interface using the CUA31 Control Unit adapter. The Control Unit then takes over control of the drive functions for the AC drive. SIMOTION D modules can be used as a Control Unit for motion control applications which go beyond the scope of positioning tasks.

SINAMICS S120 AC Drives can also be used in hybrid operation with SINAMICS S120 multi-axis units in this constellation. This provides maximum flexibility for the use of SINAMICS S120 units.



CU310 Control Unit (left)  
CUA31 Control Unit adapter (right)

## Standardized, comfortable engineering with SIZER and STARTER

As with all SINAMICS drives, the SIZER configuring tool helps you to select the optimal drive configuration for your application. Graphical support and wizards efficiently guide you through the selection of necessary components based on your application.

SINAMICS S120 AC Drives are commissioned using STARTER, the commissioning tool for the SINAMICS family. Electronic rating plates ensure automatic and error-free preconfiguration of the drive system. Automatic optimization is a simple way of optimizing the control response. It ensures fast and reliable commissioning of the drives.



## SINAMICS S120 Power Modules

The frame size of the Power Modules depends on the power output.

We differentiate between block size and chassis units, which are available in various frame sizes.

SINAMICS S120 AC Drives – Power Modules								
	Blocksize units						Chassis units	
Frame size	A	B	C	D	E	F	FX	GX
230 V 1 AC (kW) (HP)	0.25 – 1.1 (0.34 – 1.5)	–	–	–	–	–	–	–
400 V 3 AC (kW) (HP)	0.37 – 1.5 (0.5 – 2)	2.2 – 4 (3 – 5)	7.5 – 15 (10 – 20)	18.5 – 30 (25 – 40)	37 – 45 (50 – 60)	55 – 90 (74 – 121)	110 – 132 (147 – 177)	160 – 250 (214 – 335)

# SINAMICS S120 AC Drive

SINAMICS S120 AC Drive		
Modular drive system for demanding single/multi-axis applications		
Blocksize design		Chassis design
		
Drive type	AC/AC unit, modular	
Degree of protection	IP20	
Supply voltages $V_{\text{supply}}$ /Power ratings • 230 V 1 AC • 380 – 480 V 3 AC	0.25 – 1.1 kW (0.3 – 1.5 HP) 0.37 – 90 kW (0.5 – 121 HP)	– 110 – 250 kW (147 – 335 HP)
Technological functions	Flying restart, restart, kinetic buffering, positioning, BICO technology, Motion Control (in connection with SIMOTION)	
Safety functions	Safe standstill (SH), Safe brake control (SBC)	Safe standstill (SH)
Tools	SIZER for configuring, STARTER for commissioning	
Typical application technologies	High-performance single drives  Continuous motion control; continuous material webs; setpoint cascades; positioning; coordinated, highly dynamic motion control of several axes via position; cross-axis motion control functionality using SIMOTION (synchronism, electronic cam disks, ...) Numerical control in machine tools in conjunction with SINUMERIK solution line	
Communication interface	PROFIBUS DP, PROFINET <sup>1)</sup>	
Line frequency	47 – 63 Hz	
Output voltage	0 ... $V_{\text{supply}}$	
Output frequency	Vector control: 0 – 300 Hz, Servo control: 0 – 650 Hz	
Control principle • V/f control • Vector Control with/without encoder • Servo Control with/without encoder	Yes Yes Yes	
Motors • Asynchronous • Synchronous • Torque • Linear	Yes Yes Yes Yes	
Control dynamics • Rise time of speed control  • Rise time of torque control	Vector Control: 25 ms without encoder, 11 – 15 ms with encoder or 2.1 ms with int. acceleration pre-control, Servo Control: 1.1 ms (with 125 µs current controller clock cycle) Vector Control: approx. 1 ms, Servo control: approx. 0.6 ms	

1) Available soon.

For further information on SINAMICS S120, go to:

[www.siemens.com/sinamics-S120](http://www.siemens.com/sinamics-S120)

The information provided in this brochure contains merely general descriptions or performance characteristics which in case of actual use do not always apply as described or which may change as a result of further development of the products. An obligation to provide the respective characteristics shall exist only if expressly agreed in the terms of contract.

## 6.2 Control Unit CU310 DP (PROFIBUS)

### 6.2.1 Description

The Control Unit 310 DP (PROFIBUS) is the component in which the open-loop and closed-loop control functions of a drive are implemented.

The CU310 DP has the following interfaces (ports):

Table 6-1 Overview of the CU310 interfaces

Type	Number
Digital inputs	4
Digital inputs/outputs	4
DRIVE-CLiQ interfaces	1
PROFIBUS interface	1
Serial interface (RS232)	1
Power Module Interface (PM-IF)	1
Encoder interface (HTL/TTL)	1
EP terminals/ temperature sensor connection	1
24 V electronics power supply	1
Test sockets	3+1
Interface for BOP	1

---

#### Note

For test purposes, the fan also runs in the cold state at regular intervals.

---

### 6.2.2 Safety information

---

#### Note

The CompactFlash card may only be inserted and removed from the Control Unit when in the no-voltage condition.

---



---

#### Caution

The cooling clearances of 50 mm above and below the components must be observed. It is not permissible that the connecting cables cover the cooling openings.

---

## 6.2.3 Interface description

### 6.2.3.1 Overview

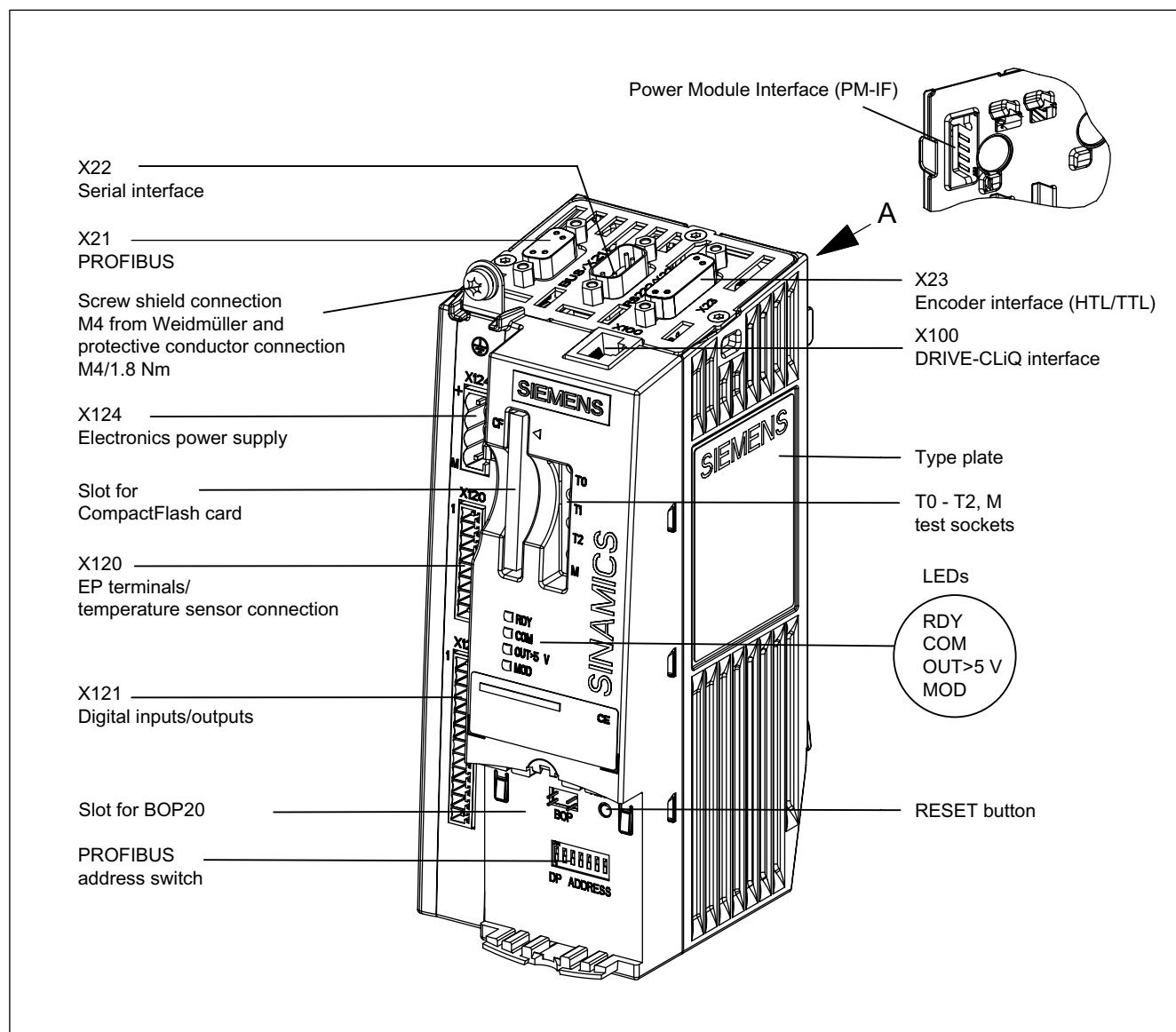


Figure 6-3 Description of the CU310 DP interfaces (ports)

## 6.2.3.2 Sample connection

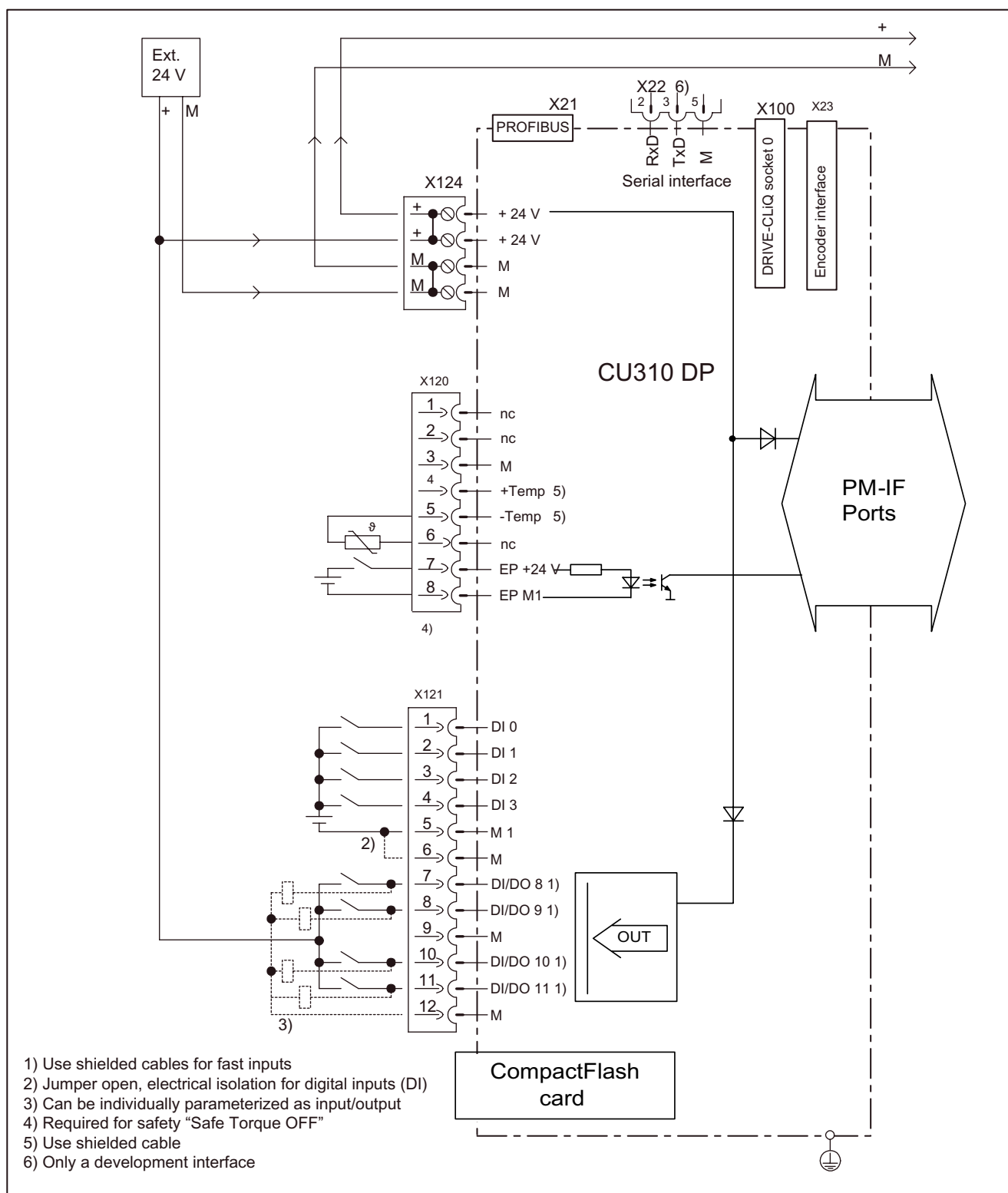
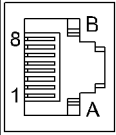


Figure 6-4 Connection example CU310 DP

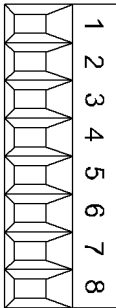
### 6.2.3.3 X100 DRIVE-CLiQ interface

Table 6-2 DRIVE-CLiQ interface

	Pin	Signal name	Technical specifications
	1	TXP	Transmit data +
	2	TXN	Transmit data -
	3	RXP	Receive data +
	4	Reserved, do not use	
	5	Reserved, do not use	
	6	RXN	Receive data -
	7	Reserved, do not use	
	8	Reserved, do not use	
	A	+ (24 V)	Power supply
	B	GND (0 V)	Electronic ground
Blanking plate for DRIVE-CLiQ interface: Molex, order number: 85999-3255			
The maximum DRIVE-CLiQ cable length is 50 m.			

### 6.2.3.4 X120 EP terminals / temperature sensor connection

Table 6-3 Terminal strip X120

	Terminal	Function	Technical specifications
	1	Reserved, do not use	
	2	Reserved, do not use	
	3	M	Ground
	4	+Temp	KTY or PTC input
	5	-Temp	Ground for KTY or PTC
	6	Reserved, do not use	
	7	EP +24 V	Safe standstill input (+)
	8	EP M1	Safe standstill input (-)
Max. cross-section that can be connected 1.5 mm <sup>2</sup>			

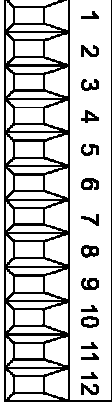
#### Notice

The KTY temperature sensor/the PTC must be connected with the correct polarity.



## 6.2.3.5 X121 digital inputs/outputs

Table 6-4 Terminal strip X121

	Terminal	Designation <sup>1)</sup>	Technical specifications
	1	DI 0	Voltage: -3 V to 30 V
	2	DI 1	Typical current consumption: 10 mA at 24 V DC
	3	DI 2	Isolation: The reference potential is terminal M1
	4	DI 3	Level (incl. ripple)
	5	M1	High level: 15 V to 30 V
	6	M	Low level: -3 V to 5 V
	7	DI/DO 8	Signal propagation times: L → H approx. 50 µs H → L: approx. 100 µs
	8	DI/DO 9	As input:
	9	M	Voltage: -3 V to 30 V
	10	DI/DO 10	Typical current consumption: 10 mA at 24 V DC
	11	DI/DO 11	Level (incl. ripple)
	12	M	High level: 15 V to 30 V
Max. cross-section that can be connected: 1.5 mm <sup>2</sup>			Low level: -3 V to 5 V
Type: Spring-loaded terminal 1 (see Appendix A)			Terminal numbers 8, 10, and 11 are "fast inputs"
			Signal propagation times for inputs/"fast inputs": L → H: approx. 50 µs/5 µs H → L: approx. 100 µs/50 µs
			As output:
			Voltage: 24 V DC
			Max. load current per output: 500 mA
			Continued-short-circuit-proof

1) DI: digital input; DI/DO: Bidirectional digital input/output; M: Electronic ground M1: Ground reference

**Notice**

An open input is interpreted as "low".

The "fast inputs" can be used in conjunction with a measuring system for position sensing.

To enable digital inputs (DI) 0 to 3 to function, terminal M1 must be connected. This can be done as follows:

Connect the digital inputs' ground reference, or a jumper to terminal M. This removes the electrical isolation for these digital inputs.

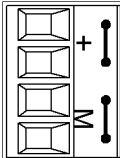
**Note**

An external 24 V power supply is required.

If a the 24 V power supply voltage is briefly interrupted, then the digital outputs are de-activated during this time.

### 6.2.3.6 Electronics power supply X124

Table 6-5 Terminal block X124

	Terminal	Function	Technical specifications
	+	Electronics power supply	Voltage: 24 V DC (20.4 V - 28.8 V)
	+	Electronics power supply	Current consumption: max. 0.8 A (without DRIVE-CLiQ or digital outputs)
	M	Electronic ground	Max. current via jumper in connector: 20 A at 55 °C
	M	Electronic ground	
Max. cross-section that can be connected: 2.5 mm <sup>2</sup> Type: Screw terminal 2 (see Appendix A)			

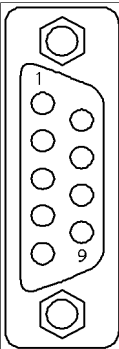
#### Note

The two “+” and “M” terminals are jumpered in the connector. This ensures the supply voltage is looped through.

The current consumption increases by the value for the DRIVE-CLiQ node.

### 6.2.3.7 X21 PROFIBUS

Table 6-6 PROFIBUS interface X21

	Pin	Signal name	Meaning	Range
	1	-	Do not use	
	2	M24_SERV	Power supply for teleservice, ground	0 V
	3	RxD/TxD-P	Receive/transmit data P (B)	RS485
	4	CNTR-P	Control signal	TTL
	5	DGND	PROFIBUS data reference potential	
	6	VP	Supply voltage plus	5 V + -10 %
	7	P24_SERV	Power supply for teleservice, + (24 V)	24 V (20.4 V - 28.8 V)
	8	RxD/TxD-N	Receive/transmit data N (A)	RS485
	9	-	Do not use	
Type: 9-pin SUB-D female				

**Note**

A teleservice adapter can be connected to the PROFIBUS interface (X21) for remote diagnosis purposes.

The power supply for the teleservice terminals 2 and 7 withstands a max. load and continued short-circuit current of 150 mA.

**PROFIBUS connector**

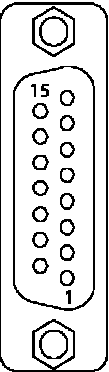
At the first and last node (device) in a line, the terminating resistors must be switched-in in order to ensure disturbance/noise-free communications.

The terminating resistors are activated in the connector.

The cable shield must be connected at both ends over large-surface area contacts.


**6.2.3.8 X23 HTL/ TTL encoder interface**

Table 6-7 Encoder connection X23

	Pin	Signal name	Technical specifications
	1	Reserved, do not use	
	2	SSI_CLK	SSI clock, positive
	3	SSI_XCLK	SSI clock, negative
	4	PENC	Encoder power supply
	5	PENC	Encoder power supply
	6	PSENSE	Remote sense encoder power supply (P)
	7	M	Electronic ground
	8	Reserved, do not use	
	9	MSENSE	Remote sense encoder power supply (N)
	10	RP	R track positive
	11	RN	R track negative
	12	BN	B track negative
	13	BP	B track positive
	14	AN_SSI_XDAT	A track negative / SSI data negative
	15	AP_SSI_DAT	A track positive / SSI data positive
Type: 15-pin SUB D connector			

### 6.2.3.9 PROFIBUS address switches

Table 6-8 PROFIBUS address switches

Technical specifications	Switch	Significance
Significance: $2^0$ $2^1$ $2^2$ $2^3$ $2^4$ $2^5$ $2^6$ 1 2 4 8 16 32 64  S1 S2 S3 S4 S5 S6 S7 Example: 1 + 4 + 32 = 37 PROFIBUS address = 37	S1	$2^0 = 1$
	S2	$2^1 = 2$
	S3	$2^2 = 4$
	S4	$2^3 = 8$
	S5	$2^4 = 16$
	S6	$2^5 = 32$
	S7	$2^6 = 64$

#### Note

The PROFIBUS address switches are defaulted to 0 or 127. In these two settings, addresses are assigned via parameters.

The address switch is behind the blanking plate. The blanking plate is part of the scope of supply.

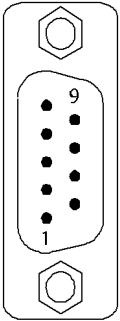
### Setting the PROFIBUS address

The following reference contains further information about setting the PROFIBUS address:

Reference: /IH1/ SINAMICS S120 Commissioning Manual.

## 6.2.3.10 X22 serial interface (RS232)

Table 6-9 Serial interface (RS-232-C) X140

	Pin	Designation	Technical data
	2	RxD	Receive data
	3	TxD	Transmit data
	5	Ground	Ground reference
Type: 9-pin SUB D connector			

## 6.2.3.11 Measurement sockets T0, T1, and T2

Table 6-10 Measurement sockets T0, T1, and T2

Socket	Function	Technical specifications
T0	Measurement socket 0	Voltage: 0 V to 5 V Resolution: 8 bits Load current: max. 3 mA Continued-short-circuit-proof
T1	Measurement socket 1	
T2	Measurement socket 2	
M	Ground	The reference potential is terminal M
The measurement sockets are only suitable for bunch pin plugs with a diameter of 2 mm.		

### 6.2.3.12 Slot for the CompactFlash card



Figure 6-5 Slot for CompactFlash card

---

#### Caution

The CompactFlash card may only be inserted as shown in the figure (arrow top right).

The CompactFlash card may only be inserted or removed when the Control Unit is in a no-voltage condition.

When returning a defective Control Unit, remove the CompactFlash card and keep it for insertion in the replacement unit.

---

## 6.2.3.13 Description of the LEDs on the Control Unit 310 DP

Table 6-11 Description of the LEDs on the Control Unit

LED	Color	State	Description
RDY (READY)	-	Off	Electronics power supply outside permissible tolerance range
	Green	Steady light	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place.
		Flashing light 2 Hz	Writing to CompactFlash card
	Red	Steady light	At least one fault is present in this component.
		Flashing light 0.5 Hz	CompactFlash card has not been inserted. Boot error (e.g. firmware cannot be loaded to the RAM).
	Green Red	Flashing light 0.5 Hz	Control Unit 310 DP is ready for operation. No software licenses for device.
	Orange	Steady light	DRIVE-CLiQ communication is being established.
		Flashing light 0.5 Hz	Unable to load firmware to RAM
		Flashing light 2 Hz	Firmware CRC error
COM (PROFIBUS cyclic operation)	-	Off	Cyclic communication is not (yet) running. Note: The PROFIBUS is ready for communication when the Control Unit is ready for operation (see RDY LED).
	Green	Steady light	Cyclic communication is running.
		Flashing light 0.5 Hz	Cyclic communication is not yet running fully. Possible reasons: <ul style="list-style-type: none"> <li>The master is not transmitting setpoints.</li> <li>No global control (GC) or master sign-of-life is transmitted during isochronous operation.</li> </ul>
	Red	Steady light	Cyclic communication has been interrupted.
OUT > 5V	-	Off	Electronics power supply is missing or outside permissible tolerance range. Power supply $\leq 5$ V.
	Orange	Steady light	Electronics power supply for measuring system available. Power supply $> 5$ V. <b>Notice</b> You must ensure that the connected encoder can be operated with a 24 V supply. If an encoder that is designed for a 5 V supply is operated with a 24 V supply, this can destroy the encoder electronics.
MOD	--	Off	Reserved

### Cause and rectification of faults

The following reference contains information about the cause and rectification of faults:

Reference: /IH1/ SINAMICS S120 Commissioning Manual.

### RESET button

The RESET button is located behind the blanking plate.

### 6.2.4 Dimension drawing

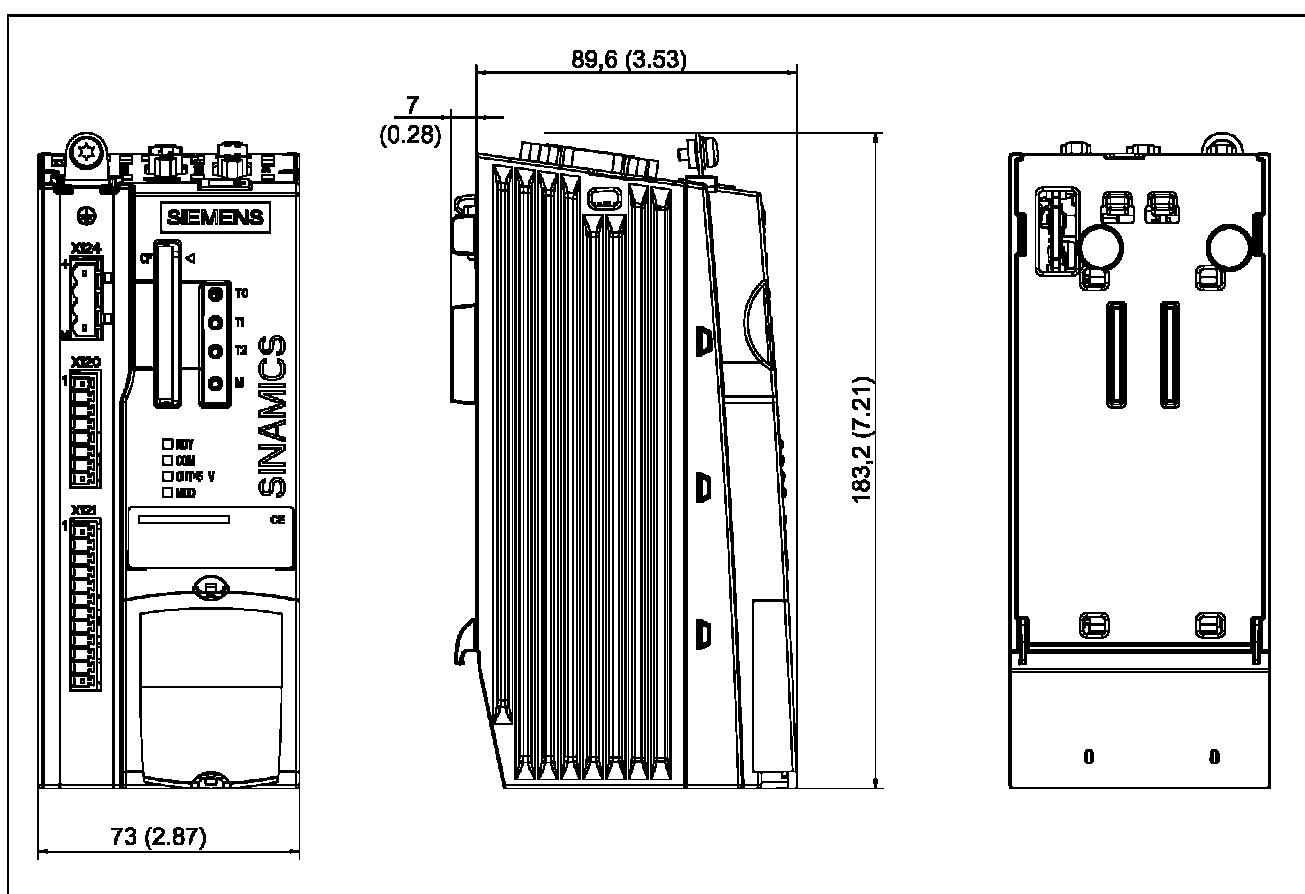


Figure 6-6 Dimension drawing CU310 DP



### 6.2.5 Mounting the CU310 on the Power Module Blocksize

As soon as the Power Module has been correctly installed, the Control Unit can be attached to the Power Module.



The procedure when mounting the Control Unit on the Power Module is independent of the frame size of the Power Modules.

## Removing the Control Unit



Removing the CU310 from the Power Module 340 (frame size D)

In order to remove the Control Unit from the Power Module, the blue release lever, as shown in the diagram, must be pressed downwards and the Control Unit swung-out to the front.

## 6.2.6 Mounting the CU310 in the Power Module Chassis

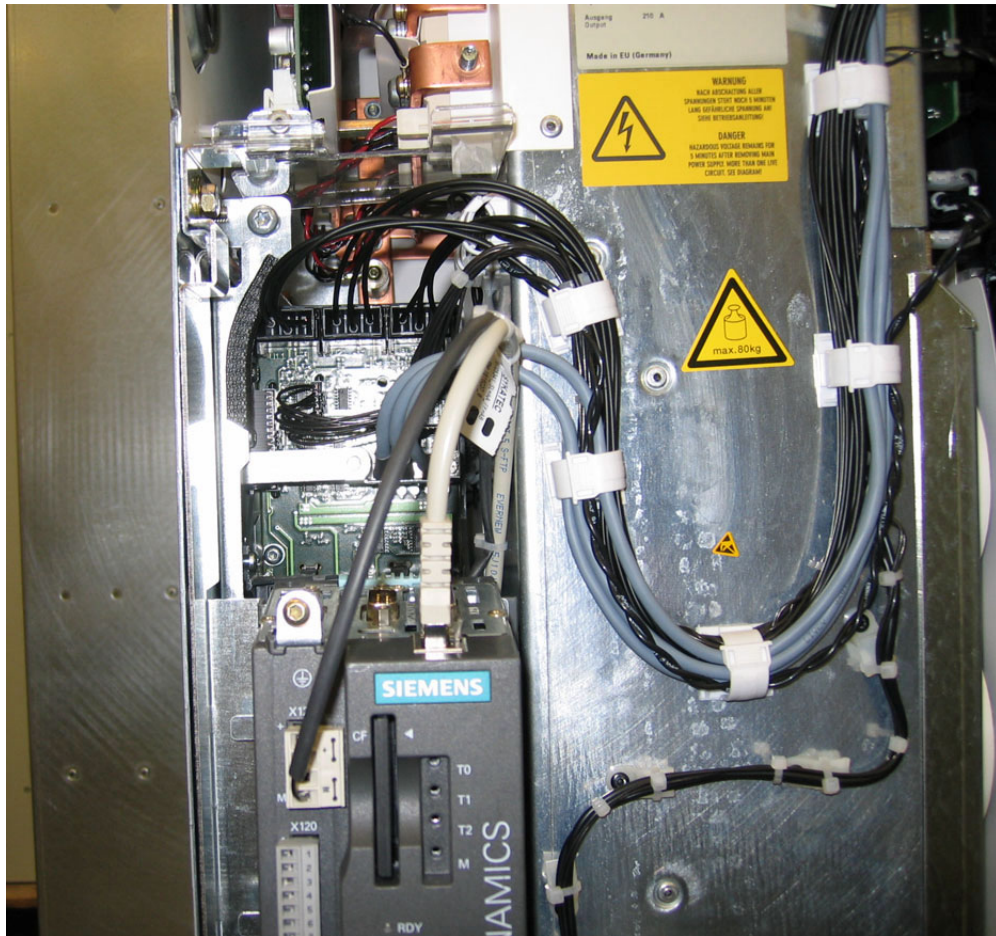


Figure 6-7 Mounting the CU310 in the Power Module Chassis, frame size FX

The DRIVE-CLiQ cable and the cable for the 24 V power supply must be correctly routed so that the front flap can close.

## 6.2.7 Technical data

Table 6-12 Technical data CU310 DP

	Unit	Value
Electronics power supply		
Voltage	V <sub>DC</sub>	DC 24 (20.4 – 28.8)
Current (without DRIVE-CLiQ and digital outputs)	A <sub>DC</sub>	0.8
Power loss	W	<20
PE/ground connection	At the housing with M4/3 Nm screw	
Response time	The response time of digital inputs/outputs depends on the evaluation (refer to the function diagram). <b>Reference:</b> /LH1/ SINAMICS S List Manual, Chapter "Function diagrams".	
Weight	kg	0.95

### 8.1.3 LEDs after the Control Unit CU310 has booted

Table 8-3 Control Unit 310 – description of the LEDs after booting

LED	Color	State	Description, cause	Remedy
RDY (READY)	–	Off	Electronics power supply is missing or outside permissible tolerance range.	–
	Green	Steady light	The module is ready for operation and cyclic DRIVE–CLiQ communication is taking place.	–
		Flashing 2 Hz	Writing to CompactFlash card.	–
	Red	Steady light	At least one fault is present in this module.	Remedy and acknowledge fault
		Flashing 0.5 Hz	Boot error	Check whether CompactFlash card is plugged in correctly Replace CompactFlash card Replace Control Unit Carry-out a POWER ON
	Green/ Red	Flashing 0.5 Hz	Control Unit 310 is ready. No software licenses.	Obtain licenses
	Orange	Steady light	DRIVE-CLiQ communication is being established.	–
		Flashing 0.5 Hz	Unable to load firmware to RAM.	Check whether CompactFlash card is plugged in correctly Replace CompactFlash card Replace Control Unit Carry-out a POWER ON
		Flashing 2 Hz	Firmware CRC error.	Check whether CompactFlash card is plugged in correctly Replace CompactFlash card Replace Control Unit Carry-out a POWER ON

Table 8-3 Control Unit 310 – description of the LEDs after booting, continued

LED	Color	State	Description, cause	Remedy
COM PROFIdrive cyclic operation	–	Off	Cyclic communication has not (yet) taken place. Note: PROFIdrive is ready for communication when the Control Unit is ready (see LED RDY).	–
	Green	Steady light	Cyclic communication is taking place.	–
		Flashing 0.5 Hz	Full cyclic communication is not yet taking place. Possible causes: <ul style="list-style-type: none"> <li>The controller is not transmitting setpoints.</li> <li>During isochronous operation, no global control (GC) or a faulty global control (GC) is transferred by the Controller.</li> </ul>	–
	Red	Steady light	Cyclic communication has been interrupted.	Remedy fault
OUT >5 V	–	Off	Electronics power supply is missing or outside permissible tolerance range. Power supply $\leq 5$ V	–
	Orange	Steady light	Electronics power supply for measuring system available. Power supply >5 V. <b>Notice</b> You must ensure that the connected encoder can be operated with a 24 V supply. If an encoder that is designed for a 5 V supply is operated with a 24 V supply, this can destroy the encoder electronics.	–
MOD	–	Off	Reserved	–

### 3.8.3 Quick commissioning using the BOP (example)

Table 3-11 Quick commissioning for a motor without a DRIVE-CLiQ interface

Outlet	Description	Factory setting
<b>Note:</b> Before commissioning for the first time, the drive must be in the factory setting. Procedure, see Subsection 3.3.1		
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">p0009 = 1</div> <div style="text-align: center;">↓</div>	<b>Device commissioning parameter filter *</b> 0 Ready 1 Device configuration 30 Parameter reset	1
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">p0097 = 2</div> <div style="text-align: center;">↓</div>	<b>Select drive object type *</b> 0 No selection 1 Drive object type SERVO 2 Drive object type VECTOR	0
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">p0009 = 0</div> <div style="text-align: center;">↓</div>	<b>Device commissioning parameter filter *</b> 0 Ready 1 Device configuration 30 Parameter reset	1
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">DO = 2</div> <div style="text-align: center;">↓</div>	<b>Select drive object (DO) 2 (= VECTOR)</b> 1 CU 2 VECTOR To select a drive object (DO), simultaneously press the Fn key and an arrow key. The selected project is displayed at the top left.	1
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">p0010 = 1</div> <div style="text-align: center;">↓</div>	<b>Drive, commissioning parameter filter *</b> 0 Ready 1 Quick commissioning 30 Parameter reset	1

\* These parameters offer more setting possibilities than specified here. For additional setting possibilities, see the List Manual

[CDS] Parameter depends on the Command Data Sets (CDS). Data set 0 is preset.

[DDS] Parameter depends on the Drive Data Sets (DDS). Data set 0 is preset.

[MDS] Parameter depends on the Motor Data Sets (MDS). Data set 0 is preset.



BI Binector Input

BO Bector Output

CI Connector Input

CO Connector Output

Table 3-11 Quick commissioning for a motor without a DRIVE-CLiQ interface, continued

Outlet	Description	Factory setting
<div>p0100 = ...</div> 	<b>IEC/NEMA mot stds</b>  0 IEC motor (SI units, e.g. kW) Pre-assignment: Rated motor frequency (p0310): 50 Hz Enter the power factor cos φ (p0308) 1 NEMA motor (US units, e.g. hp) Pre-assignment: Rated motor frequency (p0310): 60 Hz Enter the efficiency (p0309)  <b>Note</b> If p0100 is changed, all of the rated motor parameters are reset.	0
<div>p0300[0] = 15</div> 	<b>Motor type selection [MDS]*</b>  0 No motor selected Commissioning cannot be exited.  Standard motors: 1 Induction motor (rotating) 2 Synchronous motor (rotating, permanent-magnet) 5 Synchronous motor (rotary, separately-excited) 1x 1LAx standard induction motor (x = 1, 5, 6, 7, 8) 12 1LE2 standard induction motor (NEMA) You must individually enter rated motor data (see type plate) in parameter p0304 and onwards. SIEMENS catalog motors: 10x 1PHx induction motor (x = 2, 4, 7) 13x 1PMx induction motor (x = 4, 6) 2xx Synchronous motors The list motors are contained in a motor code list (see Attachment A). The motors are selected by entering the motor type (p0300) and the motor code number (p0301). The parameter for the rated motor data (p0304 and onwards) are appropriately pre-assigned.	0

\* These parameters offer more setting possibilities than specified here. For additional setting possibilities, see the List Manual

[CDS] Parameter depends on the Command Data Sets (CDS). Data set 0 is preset.

[DDS] Parameter depends on the Drive Data Sets (DDS). Data set 0 is preset.

[MDS] Parameter depends on the Motor Data Sets (MDS). Data set 0 is preset.

BI Binector Input

BO Bector Output

CI Connector Input

CO Connector Output



Table 3-11 Quick commissioning for a motor without a DRIVE-CLiQ interface, continued

Outlet	Description	Factory setting
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 10px;">p0304[0] = ... ...</div> <div style="text-align: center;">↓</div>	<b>Rated motor data [MDS]</b>  Only for p0300 < 100 (third-party motor)  Enter the rated motor data according to the type plate, e.g. p0304[0] Rated motor voltage [MDS] p0305[0] Rated motor current [MDS] p0307[0] Rated motor power [MDS] p0308[0] Rated motor power factor [MDS] (only for p0100 = 0) p0309[0] Rated motor efficiency [MDS] (only for p0100 = 1) p0310[0] Rated motor frequency [MDS] p0311[0] Rated motor speed [MDS] p0335[0] Motor cooling type [MDS] * 0: Natural cooling 1: Forced cooling 2: Water cooling	–
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 10px;">p1900 = 1</div> <div style="text-align: center;">↓</div>	<b>Motor data identification and rotating measurement*</b> 0 Inhibited 1 Motor data identification for rotating motor 2 Motor data identification at standstill Alarms A07991 and A7980 are displayed	2
<b>Danger</b> During the motor identification routine, the drive can cause the motor to move. When commissioning, EMERGENCY STOP functions must be functioning. To protect the machines and personnel, the relevant safety regulations must be carefully observed.		

\* These parameters offer more setting possibilities than specified here. For additional setting possibilities, see the List Manual

[CDS] Parameter depends on the Command Data Sets (CDS). Data set 0 is preset.

[DDS] Parameter depends on the Drive Data Sets (DDS). Data set 0 is preset.

[MDS] Parameter depends on the Motor Data Sets (MDS). Data set 0 is preset.

BI Binector Input

BO Bector Output

CI Connector Input

CO Connector Output

Table 3-11 Quick commissioning for a motor without a DRIVE-CLiQ interface, continued

Outlet	Description	Factory setting
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">p3900 = 3</div> <div style="text-align: center; margin-top: 10px;">↓</div>	<b>Completion of quick commissioning *</b> 0 No quick commissioning 1 Quick parameterization after parameter reset: Reset all parameters to the factory setting (with the exception of the quick commissioning parameter) Restore the PROFIBUS telegram (p0922) and the BICO interconnections (p0700, p1000, p1500) Motor calculation corresponding to p0340 = 1 2 Quick parameterization (only) for BICO and motor parameters Restore the PROFIBUS telegram (p0922) and the BICO interconnections (p0700, p1000, p1500) Motor calculation corresponding to p0340 = 1 3 Quick parameterization (only) for motor parameters Only motor calculation corresponding to p0340 = 1 When the calculations have been completed, p3900 and p0010 are automatically set to 0. Parameters of a selected SIEMENS catalog motor (p0301) are not overwritten.	0
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">p0840[0] = r0019.0(DO 1)</div> <div style="text-align: center; margin-top: 10px;">↓</div>	<b>BI: ON/OFF1 [CDS]</b> Sets the signal source for STW1.0 (ON/OFF1) Interconnecting to r0019.0 of the drive object Control Unit (DO 1) Effect: Signal ON/OFF1 from the BOP Binector interconnections with the BOP20, see Subsection 9.13.2	0
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">p1035[0] = r0019.13 (DO 1)</div> <div style="text-align: center; margin-top: 10px;">↓</div>	<b>BI: Motorized potentiometer, raise setpoint [CDS]</b> Sets the signal source to increase the setpoint for the motorized potentiometer Interconnecting to r0019.13 of the drive object Control Unit (DO 1) Effect: Signal, motorized potentiometer raise setpoint from BOP Binector interconnections with the BOP20, see Subsection 9.13.2	0
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">p1036[0] = r0019.14 (DO 1)</div> <div style="text-align: center; margin-top: 10px;">↓</div>	<b>BI: Motorized potentiometer, lower setpoint [CDS]</b> Sets the signal source to reduce the setpoint for the motorized potentiometer Interconnecting to r0019.14 of the drive object Control Unit (DO 1) Effect: Signal, motorized potentiometer lower setpoint from BOP Binector interconnections with the BOP20, see Subsection 9.13.2	0

\* These parameters offer more setting possibilities than specified here. For additional setting possibilities, see the List Manual

[CDS] Parameter depends on the Command Data Sets (CDS). Data set 0 is preset.

[DDS] Parameter depends on the Drive Data Sets (DDS). Data set 0 is preset.

[MDS] Parameter depends on the Motor Data Sets (MDS). Data set 0 is preset.

BI Binector Input

BO Bector Output

CI Connector Input

CO Connector Output

Table 3-11 Quick commissioning for a motor without a DRIVE-CLiQ interface, continued

Outlet	Description	Factory setting
<div style="border: 1px solid black; padding: 2px; display: inline-block;">p1070[0] = r1050 (DO 63)</div> <div style="text-align: center; margin-top: 10px;">↓</div>	<b>CI: Main setpoint [CDS]</b> Sets the signal source for speed setpoint 1 of the speed controller Interconnecting to r1050 on its own drive object (DO 63) Effect: Motorized potentiometer supplies the speed setpoint Binector interconnections with the BOP20, see Subsection 9.13.2	0
<div style="border: 1px solid black; padding: 2px; display: inline-block;">p0006 = 0</div> <div style="text-align: center; margin-top: 10px;">↓</div>	<b>BOP operating display mode*</b> 0 Operation → r0021, otherwise r0020 ↔ r0021 1 Operation → r0021, otherwise r0020 2 Operation → p0005, otherwise p0005 ↔ r0020 3 Operation → r0002, otherwise r0002 ↔ r0020 4 p0005	4
Save all parameters	Press the P key for 3s	

\* These parameters offer more setting possibilities than specified here. For additional setting possibilities, see the List Manual

[CDS] Parameter depends on the Command Data Sets (CDS). Data set 0 is preset.

[DDS] Parameter depends on the Drive Data Sets (DDS). Data set 0 is preset.

[MDS] Parameter depends on the Motor Data Sets (MDS). Data set 0 is preset.

BI Binector Input

BO Bector Output

CI Connector Input

CO Connector Output

### **3.9 Commissioning for the first time using as an example Servo AC DRIVE with BOP20**

The commissioning example described in this chapter shows all the necessary configuration and parameter settings. Commissioning is performed using the BOP20.

#### **Requirements for commissioning**

1. The commissioning requirements have been met.  
—> see Section 2.1
2. The checklist for commissioning has been completed and all items are O.K.  
—> see Section 2.1

### 3.9.1 Task

1. Commission a drive unit (operating mode servo, closed-loop speed control) with the following components:

Table 3-12 Component overview

Designation	Component	Order No.
<b>Closed-loop control</b>		
Control Unit	Control Unit 310 DP	6SL3040-0LA00-0AAx
Operator Panel	Basic Operator Panel 20 (BOP20)	6SL3055-0AA00-4BAx
<b>Infeed and drive</b>		
Power Module	Power Module 340	6SL3210-xxxx-xxxx
Motor	Synchronous motor with DRIVE-CLiQ interface	1FK7061-7AF7x-xAxx
Motor encoder via DRIVE-CLiQ	Incremental encoder sin/cos C/D 1Vpp 2048 p/r	1FK7xxx-xxxxx-xAxx

2. Commissioning is performed using the BOP20.
3. The function keys of the Basic Operator Panel (BOP) should be parameterized so that the ON/OFF signal and the speed setpoints are entered using these keys.

### 3.9.2 Component wiring (example)

The following diagram shows a possible component configuration and wiring option. The DRIVE-CLiQ wiring is highlighted in **bold**.

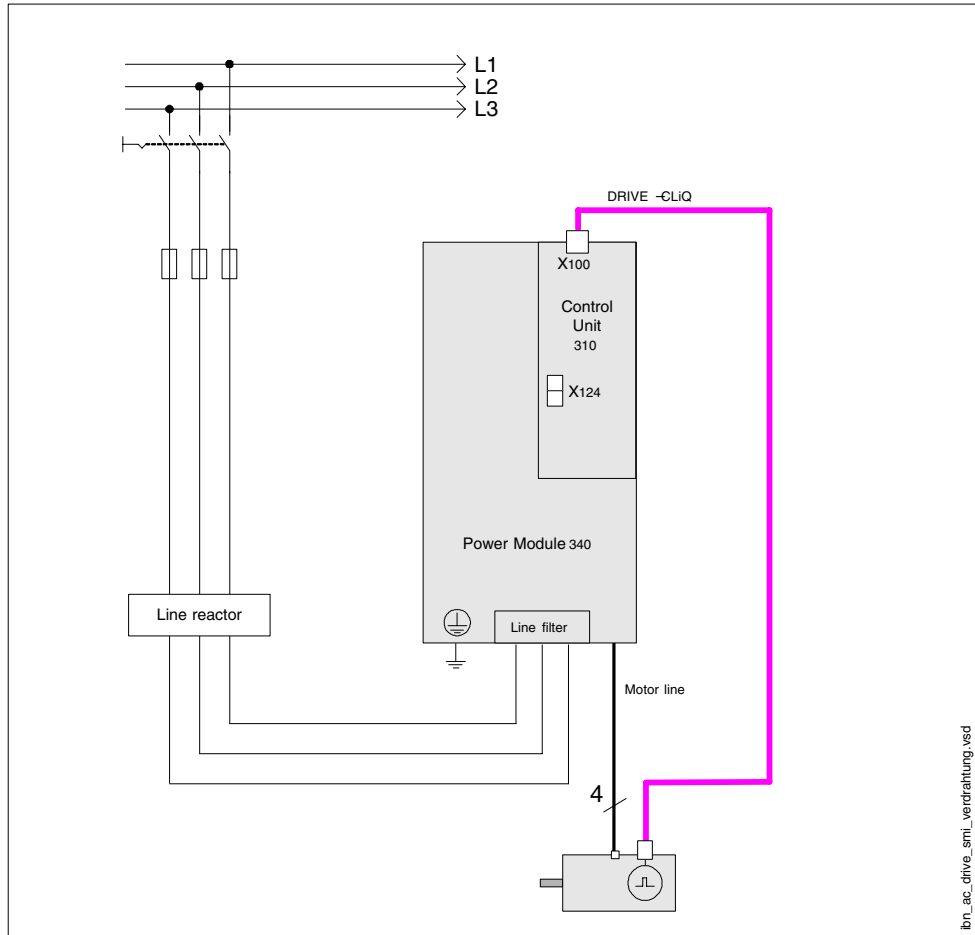


Fig. 3-14 Component wiring with integrated sensor module (example)

For more information on the wiring and connecting-up the encoder system, see the Equipment Manual.

### 3.9.3 Quick commissioning using the BOP (example)

Table 3-13 Quick commissioning for a motor with a DRIVE-CLiQ interface

Outlet	Description	Factory setting
<b>Note:</b> Before commissioning for the first time, the drive must be in the factory setting. Procedure, see Subsection 3.3.1		
<div style="border: 1px solid black; padding: 2px; display: inline-block;">p0009 = 1</div> ↓	<b>Device commissioning parameter filter *</b> 0 Ready 1 Device configuration 30 Parameter reset	1
<div style="border: 1px solid black; padding: 2px; display: inline-block;">p0097 = 1</div> ↓	<b>Select drive object type *</b> 0 No selection 1 Drive object type SERVO 2 Drive object type VECTOR	0
<div style="border: 1px solid black; padding: 2px; display: inline-block;">p0009 = 2</div> ↓	<b>Device commissioning parameter filter *</b> 0 Ready 1 Device configuration 2 Define drive type / drive options 30 Parameter reset	1
<div style="border: 1px solid black; padding: 2px; display: inline-block;">p0108[1] = H0104</div> ↓	<b>Drive object, function module *</b> Bit 2 Speed/torque control Bit 8 Expanded setpoint channel	0000
<div style="border: 1px solid black; padding: 2px; display: inline-block;">p0009 = 0</div> ↓	<b>Device commissioning parameter filter *</b> 0 Ready 1 Device configuration 30 Parameter reset	1
<div style="border: 1px solid black; padding: 2px; display: inline-block;">DO = 2</div> ↓	<b>Select drive object (DO) 2 (= SERVO)</b> 1 CU 2 SERVO To select a drive object (DO), simultaneously press the Fn key and an arrow key. The selected project is displayed at the top left.	1

\* These parameters offer more setting possibilities than specified here. For additional setting possibilities, see the List Manual

[CDS] Parameter depends on the Command Data Sets (CDS). Data set 0 is preset.

[DDS] Parameter depends on the Drive Data Sets (DDS). Data set 0 is preset.

BI Binector Input

BO Bector Output

CI Connector Input

CO Connector Output

Table 3-13 Quick commissioning for a motor with a DRIVE-CLiQ interface, continued

Outlet	Description	Factory setting
<div>p0840[0] = r0019.0(DO 1)</div> <div>↓</div>	<b>BI: ON/OFF1 [CDS]</b> Sets the signal source for STW1.0 (ON/OFF1) Interconnecting to r0019.0 of the drive object Control Unit (DO 1) Effect: Signal ON/OFF1 from the BOP Binector interconnections with the BOP20, see Subsection 9.13.2	0
<div>p1035[0] = r0019.13 (DO 1)</div> <div>↓</div>	<b>BI: Motorized potentiometer, raise setpoint [CDS]</b> Sets the signal source to increase the setpoint for the motorized potentiometer Interconnecting to r0019.13 of the drive object Control Unit (DO 1) Effect: Signal, motorized potentiometer raise setpoint from BOP Binector interconnections with the BOP20, see Subsection 9.13.2	0
<div>p1036[0] = r0019.14 (DO 1)</div> <div>↓</div>	<b>BI: Motorized potentiometer, lower setpoint [CDS]</b> Sets the signal source to reduce the setpoint for the motorized potentiometer Interconnecting to r0019.14 of the drive object Control Unit (DO 1) Effect: Signal, motorized potentiometer lower setpoint from BOP Binector interconnections with the BOP20, see Subsection 9.13.2	0
<div>p1070[0] = r1050 (DO 63)</div> <div>↓</div>	<b>CI: Main setpoint [CDS]</b> Sets the signal source for speed setpoint 1 of the speed controller Interconnecting to r1050 on its own drive object (DO 63) Effect: Motorized potentiometer supplies the speed setpoint Binector interconnections with the BOP20, see Subsection 9.13.2	0
<div>p0006 = 0</div> <div>↓</div>	<b>BOP operating display mode*</b> 0 Operation → r0021, otherwise r0020 ↔ r0021 1 Operation → r0021, otherwise r0020 2 Operation → p0005, otherwise p0005 ↔ r0020 3 Operation → r0002, otherwise r0002 ↔ r0020 4 p0005	4
Save all parameters	Press the P key for 3s	

\* These parameters offer more setting possibilities than specified here. For additional setting possibilities, see the List Manual

[CDS] Parameter depends on the Command Data Sets (CDS). Data set 0 is preset.

[DDS] Parameter depends on the Drive Data Sets (DDS). Data set 0 is preset.

BI Binector Input

BO Bector Output

CI Connector Input

CO Connector Output



## 3.10 Commissioning linear motors (servo)

### 3.10.1 General information on commissioning linear motors

**Before commissioning motors, the following questions must be answered:**

- Are all of the prerequisites for commissioning checked and were the points in the checklist for commissioning checked (refer to Chapter 2)?

Detailed information on linear motors, encoders and power connection, configuring and mounting are provided in:

/PJLM/ Configuration Manual for Linear Motors 1FN1, 1FN3

#### Terminology for rotary and linear drives

Table 3-14 Comparison

Terminology for rotary drives	Terminology for linear drives
Speed	Velocity
Torque	Force
Stator	Primary section
Rotor	Secondary section
Rotor	Secondary section
Direction of rotation	Direction
Pulse number	Grid spacing
Rotate	Run

#### Checks in the no-current state

The following checks can be made:

##### 1. Linear motor

- Which linear motor is being used?  
1FN \_\_\_\_\_
- Is the motor already mounted and ready to be powered up?
- If a cooling circuit is being used, is it functional?

##### 2. Mechanical system

- Is the axis easy to move over the complete traversing range?
- Does the air gap between the primary and secondary section and the mounting dimensions correspond to the motor manufacturer's data?

- Hanging (suspended) axis:  
If wait equalizing is used for the axis is this functioning?
- Brake:  
If a brake is being used, is it correctly controlled (see Function Manual)?
- Traversing range limiting:  
Are the mechanical end stops available and tightly bolted to both ends of the traversing path?
- Are the moving feeder cables correctly routed in a cable drag assembly?

3. Measuring system

- Which measuring system is being used?

-----

Absolute or incremental abs ☐ incr ☐

Grid spacing \_\_\_\_\_  $\mu\text{m}$

Zero marks (number and position) \_\_\_\_\_

- Where is the positive drive direction?  
Where is the positive counting direction of the measuring system?  
Invert (p0410)? yes ☐ no ☐

4. Wiring

- Power Module (connect UVW, phase sequence, clockwise rotating field)
- Protective conductor connected?
- Screen connected?
- Temperature monitoring circuits:  
Are the cables connected to the terminal block of the screen connecting plate?
  - > Temperature sensor (Temp-F):  
The temperature sensor (Temp-F) can be used to measure the mean absolute winding temperature.
  - > Overtemperature switch (Temp-S)  
The over temperature shutdown circuit (Temp-S) allows each individual motor phase winding to be digitally monitored for an overtemperature condition.

## 7.2 Safe standstill (SH)

### General description

In conjunction with a machine function or in the event of an error, the “Safe standstill (SH)” function is used to safely disconnect the torque-generating motor power supply.

When the function is selected, the drive unit is in a “safe status”. The power-on disable function prevents the drive unit from being restarted.

The pulse cancellation integrated in the Motor Modules / Power Modules is a basis for this function.

### Features of “safe standstill”

- This function is integrated in the drive; this means that a higher-level controller is not required.
- The function is drive specific, that is, it must be commissioned individually on a drive-by-drive basis.
- Enable of the function using parameters required
- The terminals for the “safe standstill” function can be grouped together. Not for the Control Unit CU310.
- When the “safe standstill” function is selected:
  - The motor cannot be started accidentally.
  - The pulse disable safely disconnects the torque-generating motor power supply.
  - The power unit and motor are not electrically isolated.



### Caution

Appropriate measures must be taken to ensure that the motor does not move once the motor power supply has been disconnected (“coast down”) (e.g. enable the “Safe brake control” function with a vertical axis).

---

**Caution**

If two power transistors in the power unit (one in the upper and one in the lower bridge) fail at the same time, this can cause a momentary movement.

The maximum movement can be:

Synchronous rotary motors: max. movement =  $180^\circ$  / number of pole pairs

Synchronous linear motors: max. movement = pole width

- The status of the “Safe standstill” function is displayed via the appropriate parameters.

**Overview of the safety function terminals for SINAMICS S120**

The different power unit formats of SINAMICS S120 have different terminal designations for the inputs of the safety functions. These are shown in the following table.

Table 7-1 Inputs for safety functions

	<b>1. Shutdown path (p9620)</b>	<b>2. Shutdown path</b>
Control unit CU320	X122.1...4 / X132.1...4 (on the CU320) Digital inputs 0 to 7	(see Motor Modules / Power Modules)
Single Motor Module Booksize	(see CU320)	X21.3 and X21.4 (on the Motor Module)
Single Motor Module Chassis	(see CU320)	X41.1 and X41.2 (on the CIB)
Double Motor Module Booksize	(see CU320)	X21.3 and X21.4 (motor connection X1)/ X22.3 and X22.4 (motor connection X2) (on the Motor Module)
Power Module Blocksize with CUA31	(see CU320)	X210.3 and X210.4 (on the CUA31)
Power Module Blocksize with CU310	X121.1...4 (on the CU310) Digital inputs 0 to 3	X120.7 and X120.8 (on the CU310)
Power Module Chassis with CU310	X121.1...4 (on the CU310) Digital inputs 0 to 3	X41.1 and X41.2 (on the CIB)
For further information about the terminals, refer to the Equipment Manuals		

**Enabling the “Safe standstill (SH)” function**

The “Safe standstill” function is enabled via the following parameters:

- p9601.0 SH via terminals (Control Unit)
- p9801.0 SH via terminals (Motor Module/Power Module/CUA31/CU310)

**Selecting/deselecting “Safe standstill”**

The “Safe standstill” function must be selected/deselected “simultaneously” in both monitoring channels using the input terminals and act only on the associated drive.

1 signal: Deselect function

0 signal: Select function

“Simultaneously” means:

The changeover must be complete in both monitoring channels within the parameterized tolerance time.

- p9650 SI tolerance time SGE changeover (Control Unit)
- p9850 SI tolerance time SGE changeover (Motor Module)

If the “Safe standstill” function is not selected/deselected within the tolerance time, this is detected by the crosswise data comparison and fault F01611 or F30611 (STOP F) is output. In this case, the pulses have already been canceled as a result of the selection of “safe standstill” on one channel.

The following occurs when “Safe standstill” is selected:

- Each monitoring channel triggers the safe pulse disable via its shutdown path.
- A motor holding brake is applied (if connected and configured).

The following occurs when “Safe standstill” is deselected:

- Each monitoring channel cancels the safe pulse disable via its shutdown path.
- The safety prompt “Apply motor holding brake” is canceled.
- Any STOP F or STOP A commands are canceled (see r9772/r9872).

---

**Note**

If “Safe standstill” is de-selected through one channel within the time in p9650/p9850, the pulses are cancelled but a signal is not output.

If you want a message to be displayed in this case, however, you have to reconfigure N01620/N30620 via p2118 and p2119 as an alarm or fault (refer to Subsection 8.3.3).

---

## 8.2.4 Measuring sockets

### Description

The measuring sockets are used to output analog signals. Any interconnectable signal can be output to any measuring socket on the Control Unit.

### Caution

The measuring sockets should be used for commissioning and servicing purposes only.

The measurements may only be carried out by properly trained specialist personnel.

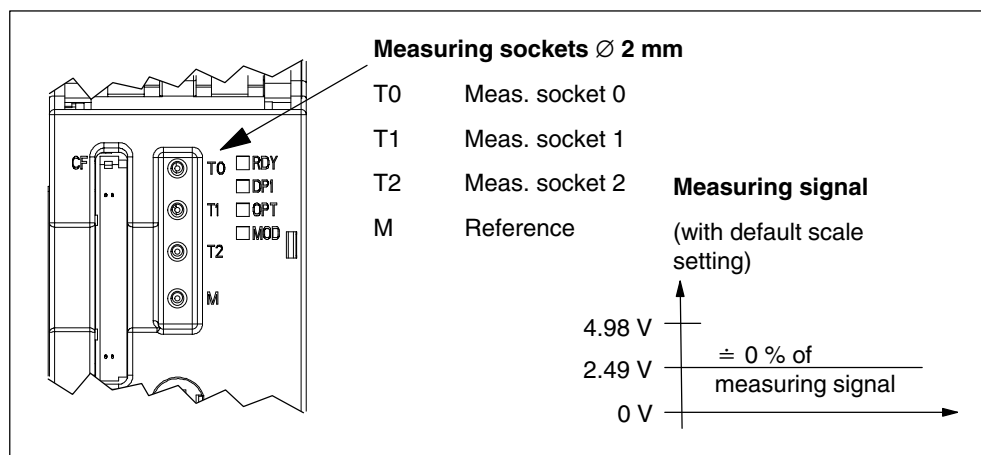


Fig. 8-9 Arrangement of the measuring sockets on the Control Unit CU310/CU320

## 9.9 Inputs/outputs

### 9.9.1 Overview of inputs/outputs

The following digital/analog inputs/outputs are available:

Table 9-20 Overview of inputs/outputs

Component	Inputs	Digital	Outputs	Analog	
		Inputs/ outputs bidirectional		Inputs	Outputs
CU310	4 <sup>1)</sup>	4 <sup>3)</sup>	–	–	–
CU320	8 <sup>1)</sup>	8 <sup>2)</sup>	–	–	–
TB30	4	–	4	2	2
TM15	–	24	–	–	–
TM31	8	4	–	2	2
	Relay outputs: 2				
	Temperature sensor input: 1				
TM41	4	4	–	1	–
	Incremental encoder emulation: 1 (also refer to: Function Manual)				

1) Adjustable: floating or non-floating

2) 6 of these are “high-speed inputs”

3) 3 of these are “high-speed inputs”

#### Note

For detailed information about the hardware properties of I/Os, please refer to:

References: /GH1/ SINAMICS S120 Equipment Manual: Control Units

For detailed information about the structural relationships between all I/Os of a component and their parameters, please refer to the function diagrams in:

References: /LH1/ SINAMICS S List Manual

## 9.12 Licensing

### Description

To use the SINAMICS S120 drive system and the activated options, you need to assign the corresponding licenses to the hardware. When doing so, you receive a license key, which electronically links the relevant option with the hardware.

The license key is an electronic license stamp that indicates that one or more software licenses are owned.

Actual customer verification of the license for the software that is subject to license is called a certificate of license.

---

### Note

Refer to the order documentation (e.g. catalogs) for information on basic functions and functions subject to license.

---

An insufficient license is indicated via the following alarm and LED on the Control Unit:

- A13000            License not sufficient
- READY LED    Flashes green/red at 0.5 Hz

---

### Notice

The drive can only be operated with an insufficient license during commissioning and servicing.

The drive requires a sufficient license in order for it to operate normally.

---

### Information regarding the Performance 1 option (this is not valid for Control Unit CU310)

The option Performance 1 (Order No.: 6SL3074-0AA01-0AA0) is required from a computation time utilization greater than 50 %. The remaining computation time is displayed in parameter r9976[2]. As of a CPU runtime utilization greater than 50%, alarm A13000 is output and the READY LED on the Control Unit flashes green/red at 0.5 Hz.

### Properties of the license key

- Assigned to a specific CompactFlash card.
- Is stored on the non-volatile CompactFlash card.
- Is not transferrable.
- Can be acquired using the “WEB License Manager” from a license database.



## p0005 BOP operating display selection

**Changeable:** U T

**Data type:** Unsigned16

**Object:** A\_INF, A\_INFMV, B\_INF, B\_INFMV, CU\_G, CU\_GL, CU\_GM, CU\_S, DMC20, SERVO, S\_INF, TB30, TM15, TM15DI\_DO, TM17, TM31, TM41, VECTOR, VECTORMV

**Group of units:** -

**Min**

0

**Quick commission:** NO

**Data block:** -

**P group:** -

**Unit selection:** -

**Max**

65535

**Access level:** 2

**Function diagram:** -

**Version:** 2402300

**Factory setting**

[0] 2

### Description:

Sets the parameter number for display for p0006 = 2, 4 for the Basic Operator Panel (BOP).

Examples for the SERVO drive object:

p0005 = 21: Speed actual value smoothed (r0021)

p0005 = 25: Drive output voltage smoothed (r0025)

p0005 = 26: Speed actual value smoothed (r0026)

p0005 = 27: Absolute current actual value, smoothed (r0027)

### Dependence:

See also: p0006

#### Note:

Only the monitoring parameters (only read parameters) can be set, that actually exist for the actual drive object.

## p0006 BOP operating display mode

<b>Changeable:</b> U T	<b>Quick commission:</b> NO	<b>Access level:</b> 3
<b>Data type:</b> Integer16	<b>Data block:</b> -	<b>Function diagram:</b> -
<b>Object:</b> A_INF, A_INFMV, B_INF, SERVO, S_INF, VECTOR, VECTORMV	<b>P group:</b> -	<b>Version:</b> 2402300
<b>Group of units:</b> -	<b>Unit selection:</b> -	<b>Factory setting</b>
<b>Min</b>	<b>Max</b>	[0] 4
0	4	

### Description:

Sets the mode of the operating display for the Basic Operator Panel (BOP) in the operating states "ready" and "operation".

### Values:

0: Operation --> r0021, otherwise r0020 <--> r0021  
1: Operation --> r0021, otherwise r0020  
2: Operation --> p0005, otherwise p0005 <--> r0020  
3: Operation --> r0002, otherwise r0002 <--> r0020  
4: p0005

### Dependence:

See also: p0005

### Note:

Mode 0 ... 3 can only be selected if also r0020, r0021 are available on the drive object.  
Mode 4 is available for all drive objects.

## p0013[0...49] BOP user-defined list

**Changeable:** U T

**Data type:** Unsigned16

**Object:** A\_INF, A\_INF MV, B\_INF, B\_INF MV, CU\_G, CU\_GL, CU\_GM, CU\_S, DMC20, SERVO, S\_INF, TB30, TM15, TM15DI\_DO, TM17, TM31, TM41, VECTOR, VECTORMV

**Group of units:** -

**Min**

0

**Quick commission:** NO

**Data block:** -

**P group:** Functions

**Unit selection:** -

**Max**

65535

**Access level:** 3

**Function diagram:** -

**Version:** 2402300

**Factory setting**

[0] 0

### Description:

Sets the required parameters to read and write via the Basic Operator Panel (BOP).

Activation:

1. p0003 = 3 (expert).
2. p0013[0...49] = requested parameter number
3. If required, enter p0011 = password in order to prevent non-authorized de-activation.
4. p0003 = 0 --> activates the selected user-defined list.

De-activation/change:

1. p0003 = 3 (expert).
2. If required, p0012 = p0011, in order to be authorized to change or de-activate the list.
3. If required p0013[0...49] = required parameter number.
4. p0003 = 0 --> activates the modified user-defined list.
5. p0003 > 0 --> de-activates the user-defined list.

### Dependence:

See also: p0009, p0011, p0012, p0976

### Note:

The following parameters can be read and written on the Control Unit drive object:

- p0003 (access stage)
- p0009 (device commissioning, parameter filter)
- p0012 (BOP password acknowledgment (p0013))

The following applies for the user-defined list:

- password protection is only available on the drive object Control Unit and is valid for all of the drive objects.
- p0013 cannot be included in the user-defined list for all drive objects.
- p0003, p0009, p0011, p0012, p0976 cannot, for the drive object Control Unit, be included in the user-defined list.
- the user-defined list can be cleared and de-activated "restore factory setting".

A value of 0 means: Entry is empty.

## Additional system components

### 3.1 Basic Operator Panel 20 (BOP20)

#### 3.1.1 Description

The Basic Operator Panel 20 (BOP20) is a basic operator panel with six keys and a display unit with background lighting. The BOP20 can be plugged onto the SINAMICS Control Unit CU320 and operated. Operation is only possible from SINAMICS V2.4 onwards.

The following functions are possible with the BOP:

- Input of parameters and activation of functions
- Display of operating modes, parameters, alarms and faults

#### 3.1.2 Interface description



Figure 3-1 Basic Operator Panel (BOP20)

## Overview of displays and keys

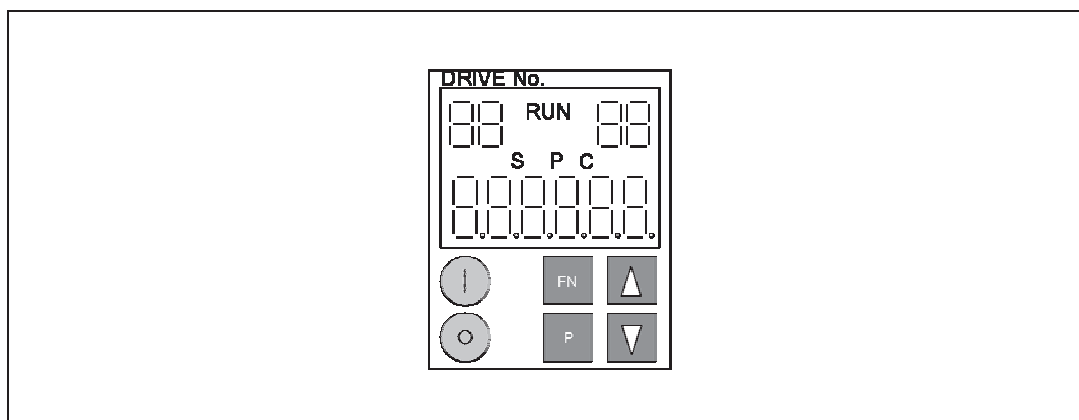








Figure 3-2 Overview of displays and keys

Table 3-1 Displays

Display	Meaning
top left 2 positions	The active drive object of the BOP is displayed here. The displays and key operations always refer to this drive object.
RUN	Is lit (bright) if the displayed drive is in the RUN state (in operation).
top right 2 positions	The following is displayed in this field: <ul style="list-style-type: none"> <li>• More than 6 digits: Characters that are present but cannot be seen (e.g. "r2" → 2 characters to the right are invisible, "L1" → 1 character to the left is invisible)</li> <li>• Faults: Selects/displays other drives with faults</li> <li>• Designation of BICO inputs (bi, ci)</li> <li>• Designation of BICO outputs (bo, co)</li> </ul> Source object of a BICO interconnection to a drive object different than the active one.
S	Is (bright) if at least one parameter was changed and the value was not transferred into the non-volatile memory.
P	Is lit (bright) if, for a parameter, the value only becomes effective after pressing the P key.
C	Is light (bright) if at least one parameter was changed and the calculation for consistent data management has still not been initiated.
Below, 6 position	Displays, e.g. parameters, indices, faults and alarms.

## BOP20 keyboard

Table 3-2 Assignment of the BOP20 keyboard

Key	Name	Meaning
	ON	Powers-up the drive - the "ON/OFF1", "OFF2" or "OFF3" commands for this purpose should come from the BOP.
	OFF	Powers-down the drive - the "ON/OFF1", "OFF2" or "OFF3" commands for this purpose should come from the BOP.
		<b>Note:</b> The effectiveness of these keys can be defined using the appropriate BICO parameterization (e.g. using these keys, it is possible to simultaneously control all of the axes that have been configured). The structure of the BOP control word corresponds to the structure of the PROFIBUS control word.
	Functions	The significance of these keys depends on the actual display. <b>Note:</b> The effectiveness of this key to acknowledge faults can be defined using the appropriate BiCo parameterization.
	Parameter	The significance of these keys depends on the actual display.
	Raise	The keys are dependent on the actual display and are used to raise or lower values.
	Lower	





## Displays and operating the BOP20

Information about the displays and using the BOP20 is provided in the following reference:

Reference: /IH1/ SINAMICS S120 Commissioning Manual

3.1.3 Installation

Table 3-3 Installation

	
1. CU320 and BOP20	2. Press the bars of the cover together
	
3. Remove the cover	4. Locate the BOP20

3.1.4 Technical data

Table 3-4 Technical data

Basic Operator Panel 20 (BOP20)		
Weight, approx.	kg	0.02